Chapter 1 – INTRODUCTION

1.1 Introduction

This chapter presents the general scope, purpose, and organization of this report.

E.I. duPont de Nemours & Co. (DuPont), the Weyerhaeuser Company (Weyerhaeuser), and the Washington State Department of Ecology (Ecology) have agreed to complete a Remedial Investigation (RI), Health Risk Assessment (RA), and Feasibility Study (FS) for the Former DuPont Works Site (Site) under the terms and conditions defined in Consent Decree No. 91-2-01703-1.

The RI, RA, and FS were conducted according to provisions of the Washington State Model Toxics Control Act (MTCA) as administered by Ecology. Under MTCA, Ecology provides guidance and criteria for the selection of cleanup actions (WAC 173-340-360). MTCA specifies criteria for selecting cleanup actions, which include the permanence of the action, protectiveness, cost, long-term effectiveness, management of short-term risks, implementability and consideration of public concerns. Under MTCA, Ecology also provides general information on the content of a feasibility study (WAC 173-340-350). This FS follows that guidance.

This FS report is a companion document to the RI and RA and should be reviewed in conjunction with these reports.

1.2 Site Description and History

The Site is located in southwestern Pierce County, within the City of Dupont, as shown on Figure 1-1. The former DuPont Works occupied an 841-acre fenced area and included Parcel 1 and Parcel 2 areas, as referenced in the Consent Decree. Remediation of Parcel 2 has been completed and this parcel was released for development by Ecology in December of 1997. This FS only addresses Parcel 1 (i.e., The Site).

The Site is bordered by Weyerhaeuser property to the north and west and WRECO property on the east, and south (Figure 1-1). Burlington Northern railroad property is adjacent to the Weyerhaeuser open space to the west. Puget Sound is located to the west of the Burlington Northern Railroad property.

Activities at the Site during operation of an explosives manufacturing facility resulted in the accumulation of residual chemicals in soils:

- In areas associated with former building foundations;
- In areas where lead paint was used and/or stored;
- In areas where manufacturing materials were stored;
- Along the narrow gauge railroad tracks;
- In waste disposal areas; and
- In low concentrations Site-wide.

1.3 Interim Source Removal

In accordance with MTCA (WAC 173-340-430) and the Consent Decree for the Site (Sections D and E), interim source removal (also referred to as interim cleanup actions) has been conducted to remove soil and/or debris from discrete locations throughout the Site. This work was done between 1990 and 2001. Actions were conducted for five primary reasons:

- To minimize the potential for transport of residual constituents in soil by removing the sources, protect groundwater, and thereby minimize potential future environmental impacts;
- To remove soil and/or debris with high concentrations of constituents to improve the safety and environmental conditions at the Site;
- To remove debris (such as drums and other demolition material overlying fill and native soils) and facilitate a more complete and accurate RI;
- To minimize delays in the Site RI, RA, and FS process; and
- To prepare for the final remediation of the Site.

For each interim source removal (ISR), complete work plans were developed, reviewed by Ecology, and revised in accordance with their comments. Prior to the initiation of any ISR, Ecology's approval to start was obtained. In addition, Ecology was communicated with regularly during these activities either by regular Site visits, periodic telephone call and/or monthly reports.

The ISR was described in a series of Interim Source Removal Memoranda submitted to Ecology following work scope completion. These memoranda referenced in the RI, present the results and provided additional details of each activity.

The total volume of materials removed from the Site during ISR (through December, 2001) included: 60,900 tons of soil; 9,700 tons of debris; 1,540 tons of soil and debris mixtures; 4,836 drums; 69,204 gallons of liquids; and 170 cubic yards (CY) of asbestos-containing material. Materials were recycled off-Site, incinerated off-Site, or sent to an approved landfill.

As a result of these efforts, this is a focused FS, which addresses the residual constituents contained in soil and debris, and the contaminated stockpiled soil generated during ISR.

1.4 RI and RA Summary

The RI investigated four media (i.e., soil, surface water, groundwater, and sediment) and determined that only soil and groundwater were media of concern. The RA evaluated the soil information presented in the RI for compliance against Site-specific cleanup levels (CLs) and remediation levels (RLs). Because chemical constituents in media other than soil and groundwater meet Site-specific CLs and RLs, this FS will focus on these media only. Minor amounts of contaminated debris are also present on-Site and will be addressed in this FS.

The RA identified 25 areas to be addressed in the FS. The basis for determination of any area requiring no further action (NFA) is described in the RA. The RA also identified CLs and RLs associated with future Site land use. Chapter 6 of this FS further evaluates these risks and land uses to assess the value of engineering controls associated with the preferred alternatives to attain the RAOs.

1.4.1 Soil

The sample data collected during the RI indicated that soil on the Site initially contained lead, arsenic, mercury, 2,4-dinitrotolouene and 2,4-dinitrotoluene (DNT), 2,4,6-trinitrotoluene (TNT), total petroleum hydrocarbons (TPH), and carcinogenic polycyclic aromatic hydrocarbons (cPAH) above MTCA screening levels.

Interim Cleanup or Source Removal Actions remediated many of these locations. These interim actions were effective in reducing the potential for impacts to the groundwater by leachable constituents and by excavating, designating, and disposing of soil which would have been difficult to treat on the Site. This FS refers to conditions within each area after completion of these actions.

1.4.2 Debris

Contaminated debris generated during ISR was disposed of off-Site based on characterization sample analytical results. Additional debris remains in-situ and will be addressed in this FS and during final cleanup action.

1.4.3 Groundwater

The RI and RA reported that groundwater impacts (concentrations above drinking water standards) are limited to one contaminant, dinitrotoluene. These concentrations are very close to the drinking water standard and have slowly been slowing decreasing. Groundwater will be discussed further in Chapter 6.

1.5 Future Land Use

The RA and FS assume certain Site land uses. They are divided at Sequalitchew Creek, with industrial uses planned for the area north of the creek and commercial, historical, and recreational (golf course) land uses planned for the areas south of the creek. Open space will occur along Sequalitchew Creek, and will encompass Old Fort Lake and surrounding land. This land use configuration is presented in Figure 1-2. Land use was used as a basis to develop exposure scenarios in the RA to derive preliminary land use and chemical specific CLs and RLs. Further evaluation was done to assess the impacts of engineering controls associated with the alternatives chosen for further evaluation in Chapter 8. In some cases these engineering controls were used to modify the RLs used in the RA and to estimate the impacted soil volumes.

1.6 Identification of Remediation Units

The area of contamination (AOC) policy developed by Ecology (Ecology, 1991) clarifies the definitions of generation and disposal as they apply to waste soil and debris found on MTCA sites. In 1993, Ecology determined that an AOC, which includes all areas within the Consent Decree Boundary (Figure 1-1), would allow on-Site consolidation, handling, and treatment of soil from various Areas on the Site.

Remediation units (RU) are groupings of the Site locations with like land uses. Each RU grouping will be treated with similar technologies and, thus, can be addressed as a single entity for the purposes of the FS. Remediation units were developed to address the residual contamination and associated soil volumes remaining after ISR (as described in Section 1.2). This FS generally uses RUs based on land size and land use type rather than similar chemical types and concentrations, RI Areas, or where deposition of these chemicals is believed to have occurred by similar mechanisms (e.g., application of herbicides). This was done to address the public's concerns over the large variance in size between the RI areas and the lack of total Site coverage. These RUs are shown on Figure 1-2 and described in section 3.2. The exceptions are Miscellaneous Small RUs, which are either small in size or have similar and/or unique characteristics. These RUs are shown on Figure 1-3.

1.7 FS Purpose and Report Organization

The primary focus of this FS is to address soil impacted by lead and arsenic. Soils impacted by other contaminants and contaminated debris occur on Site but comprise relatively small volumes. These

occurrences are referred to as "Miscellaneous Small RUs" throughout this FS. An evaluation of applicable remedial approaches for these RUs is contained in Chapter 7 and in Chapter 8.

The relationship between each section of this FS report and the process used for development and screening of remedial alternatives is presented on Figure 1-4.

This FS report is organized as follows:

- Chapter 2 summarizes RAOs designed to protect human health and the environment. The RAOs take into consideration remediation or cleanup levels identified in the RA and relevant state and federal regulations. The relevant cleanup or remediation levels form the basis of the estimated impacted soil volumes and are also used to assess the feasibility of potential remedial alternatives.

- Chapter 3 defines the RUs and summarizes the impacted soil volumes that will be addressed by the cleanup action.

- Chapter 4 describes applicable technologies and associated process options, and summarizes the screening of those technologies. Preliminary screening was performed based on professional judgment of the effectiveness of the technology and process options to remediate Site soil. Following the preliminary screening to eliminate technologies that are not suitable to remediate constituents at the Site, specific processes were assembled to represent a range of options for each technology. A qualitative screening of process options was then conducted based on effectiveness, implementability, and cost screening criteria. After this screening, at least one specific process was selected to represent each retained technology for combination into plausible remedial alternatives.

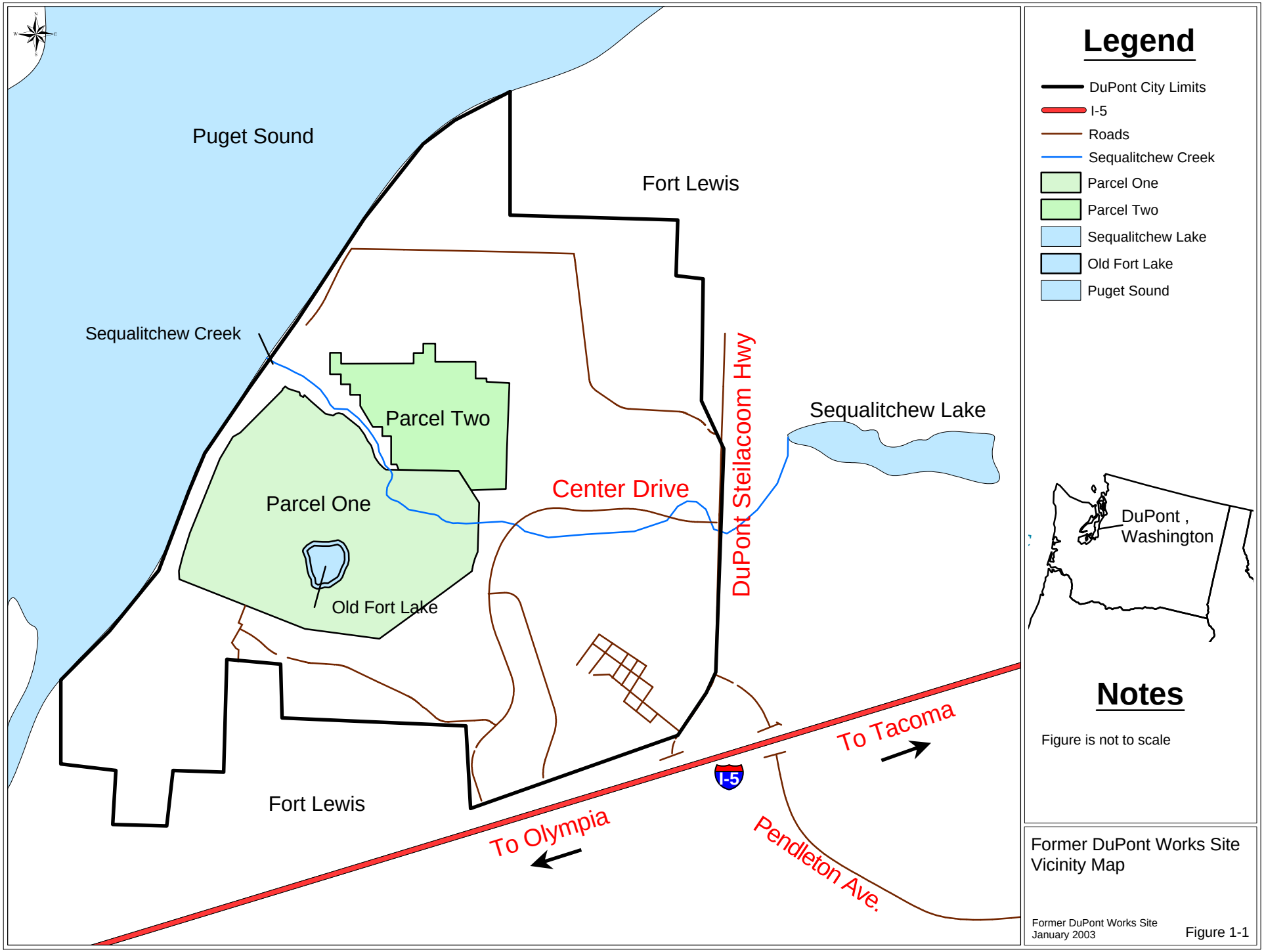
- Chapter 5 summarizes the scope, results, and recommendations from the treatability studies performed on various impacted soils.

- Chapter 6 describes and evaluates the application of remedial alternatives (groups of applicable technologies) to the cleanup action at the Site. Initially, groups of applicable technologies were assembled into alternatives that would be plausible for remediation of Site soils. Then, a quantitative screening of each alternative was conducted. The difference between this screening and the initial screening as discussed in Chapter 4 is that the criteria were weighted and the alternatives scored by the FS team (Appendix E), and the individual elements of each criterion were examined in detail.

- Chapter 7 describes the detailed analysis of remedial alternatives. This section includes an analysis and ranking of the remedial alternatives based on the same set of evaluation criteria used in Chapter 6 applied with greater detail. A comparative analysis identifies the performance of the retained remedial alternatives for each criterion. Cost is evaluated in detail using generic unit costs and recent vendor estimates for direct costs. Indirect costs associated with contingency, engineering design, administration, construction oversight, and community relations are also estimated. The recommended alternative for each RU grouping is selected in this section.

- Chapter 8 defines the recommended strategy for the Site cleanup action. The proposed steps for implementation of the selected alternative are described, pairing the selected alternatives with applicable remediation units and land use. Treatment alternatives for Miscellaneous Small RUs, containing other constituents and constituent mixtures, are also detailed.

Throughout this report, tables and figures are presented at the end of each chapter in which they are discussed. These chapters are supplemented by eight appendices, which provide supporting documentation of items discussed in the text.



Former DuPont Works Site
Vicinity Map

Former DuPont Works Site
January 2003

Figure 1-1

Legend

- Commercial
- Golf Course
- Historical
- Old Fort Lake
- Industrial
- Open Space

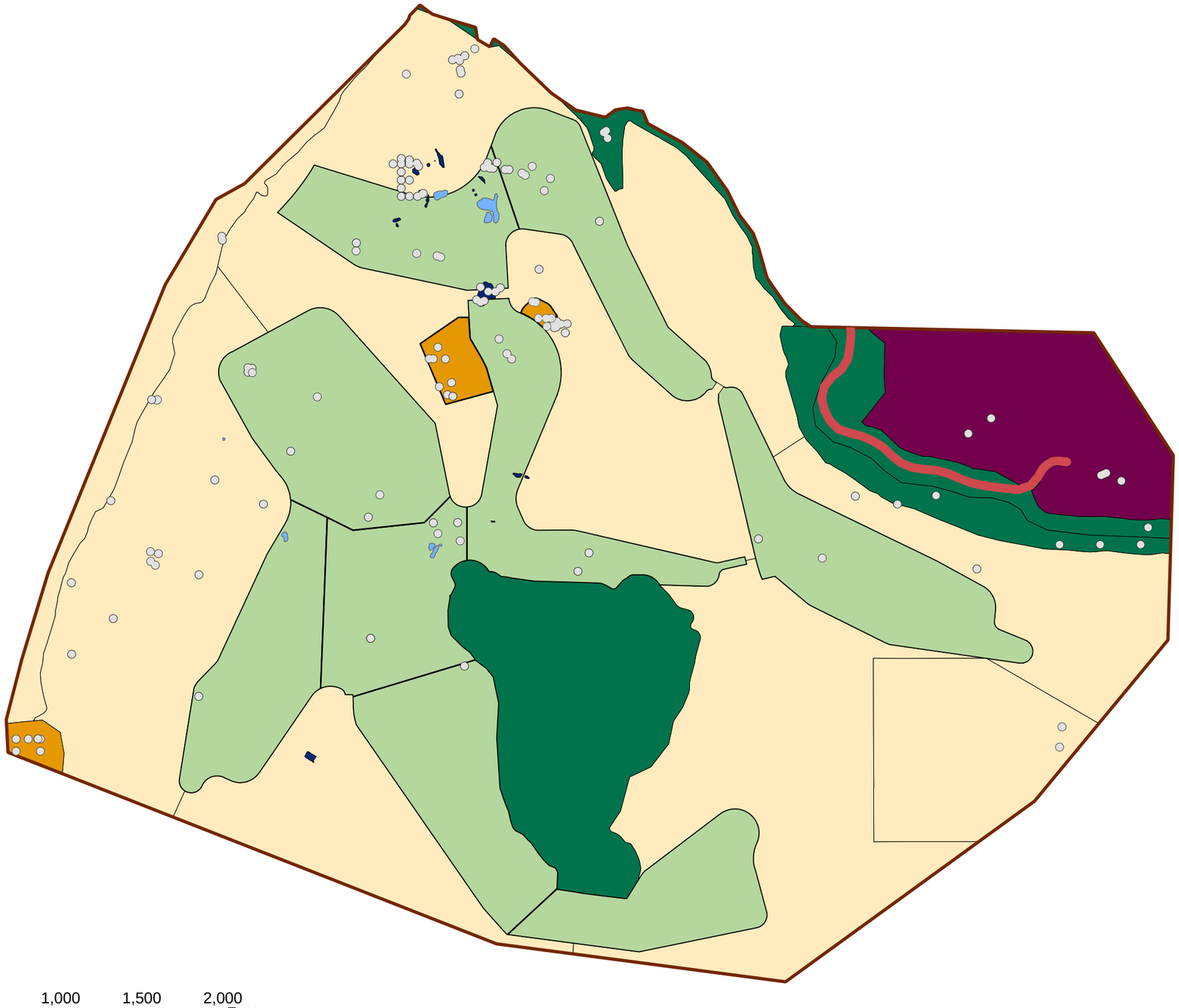
Notes

GC - Golf Course
CM - Commercial
HI - Historical
IN - Industrial
NOC - North of Creek
SOC - South of Creek

Land Use and Remediation Units

Former DuPont Works Site
September, 2002

Figure 1-2



0 250 500 1,000 1,500 2,000
Feet

Legend

Miscellaneous Small Units

- Debris Areas
- NGRR Miscellaneous Subunit
- Stockpiles
- Exceedence Locations

Evaluation Units

- Parcel One
- Industrial EU
- Open Space EU's
- Commercial EU's
- Golf Course EU's

Notes

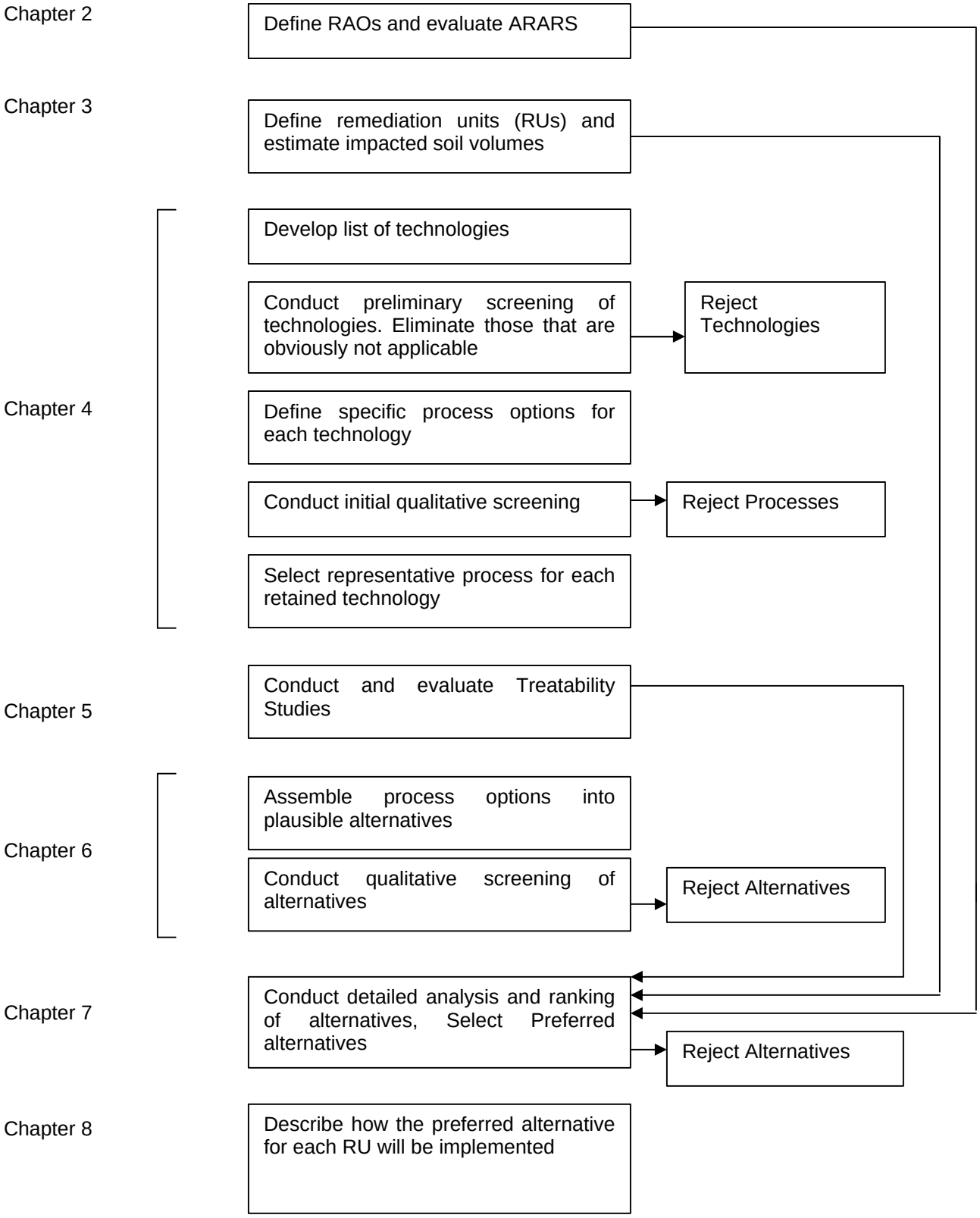
NGRR - Narrow Gauge Railroad

Miscellaneous Small Remediation Units

Former DuPont Works Site
July 2003

Figure 1-3

Figure 1-4 – Method for Screening Remedial Alternatives



1.8 References for Chapter 1

DuPont Environmental Remediation Services and Hart Crowser, 1994. Draft Risk Assessment, Former DuPont Works Site, Dupont, Washington. December 14, 1994.

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EPA, 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.

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